

**Adult stem cell**—An undifferentiated cell found in a differentiated tissue that can renew itself and (with certain limitations) differentiate to yield all the specialized cell types of the tissue from which it originated.

**Astrocyte**—One of the large neuroglia cells of neural tissues.

**Blastocoel**—The cavity in the blastula of the developing embryo.

**Blastocyst**—A preimplantation embryo of about 150 cells. The blastocyst consists of a sphere made up of an outer layer of cells (the trophoctoderm), a fluid-filled cavity (the blastocoel), and a cluster of cells on the interior (the inner cell mass).

**Bone marrow stromal cells**—A stem cell found in bone marrow that generates bone, cartilage, fat, and fibrous connective tissue.

**Cell division**—Method by which a single cell divides to create two cells. This continuous process allows a population of cells to increase in number or maintain its numbers.

**Cell-based therapies**—treatment in which stem cells are induced to differentiate into the specific cell type required to repair damaged or depleted adult cell populations or tissues.

**Cell culture**—Growth of cells *in vitro* on an artificial medium for experimental research.

**Clone**—A line of cells that is genetically identical to the originating cell; in this case, a stem cell

**Culture medium**—The broth that covers cells in a culture dish, which contains nutrients to feed the cells as well as other growth factors that may be added to direct desired changes in the cells.

**Differentiation**—The process whereby an unspecialized early embryonic cell acquires the features of a specialized cell such as a heart, liver, or muscle cell.

**Directed differentiation**—Manipulating stem cell culture conditions to induce differentiation into a particular cell type.

**DNA**—Deoxyribonucleic acid, a chemical found primarily in the nucleus of cells. DNA carries the instructions for making all the structures and materials the body needs to function.

**Ectoderm**—Upper, outermost layer of a group of cells derived from the inner cell mass of the blastocyst; it gives rise to skin nerves and brain.

**Embryo**—In humans, the developing organism from the time of fertilization until the end of the eighth week of gestation, when it becomes known as a fetus.

**Embryoid bodies**—Clumps of cellular structures that arise when embryonic stem cells are cultured.

**Embryonic germ cells**—Cells found in a specific part of the embryo/fetus called the gonadal ridge that normally develop into mature gametes.

**Embryonic stem cells**—Primitive (undifferentiated) cells from the embryo that have the potential to become a wide variety of specialized cell types.

**Embryonic stem cell line**—Embryonic stem cells, which have been cultured under *in vitro* conditions that allow proliferation without differentiation for months to years.

**Endoderm**—Lower layer of a group of cells derived from the inner cell mass of the blastocyst; it gives rise to lungs and digestive organs.

**Feeder layer**—Cells used in co-culture to maintain pluripotent stem cells. Cells usually consist of mouse embryonic fibroblasts.

**Fertilization**—The process whereby male and female gametes unite.

**Fetus**—A developing human from usually two months after conception to birth.

**Gene**—A functional unit of heredity that is a segment of DNA located in a specific site on a chromosome. A gene directs the formation of an enzyme or other protein.

**Hematopoietic stem cell**—A stem cell from which all red and white blood cells develop.

**Human embryonic stem cell**—A type of pluripotent stem cell derived from the inner cell mass of the blastocyst.

**In vitro**—Literally, "in glass"; in a laboratory dish or test tube; an artificial environment.

**In vitro fertilization**—An assisted reproduction technique in which fertilization is accomplished outside the body.

**Inner cell mass**—The cluster of cells inside the blastocyst. These cells give rise to the embryonic disk of the later embryo and, ultimately, the fetus.

**Long-term self-renewal**—The ability of stem cells to renew themselves by dividing into the same non-specialized cell type over long periods (many months to years) depending on the specific type of stem cell.

**Mesenchymal stem cells**—Cells from the immature embryonic connective tissue. A number of cell types come from mesenchymal stem cells, including chondrocytes, which produce cartilage.

**Mesoderm**—Middle layer of a group of cells derived from the inner cell mass of the blastocyst; it gives rise to bone, muscle, and connective tissue.

**Microenvironment**—The molecules and compounds such as nutrients and growth factors in the fluid surrounding a cell in an organism or in the laboratory, which are important in determining the characteristics of the cell.

**Neural stem cell**—A stem cell found in adult neural tissue that can give rise to neurons, astrocytes, and oligodendrocytes.

**Neurons**—Nerve cells, the structural and functional unit of the nervous system. A neuron consists of a cell body and its processes, an axon, and one or more dendrites. Neurons function by the initiation and conduction of impulses and transmit impulses to other neurons or cells by releasing neurotransmitters at synapses.

**Oligodendrocyte**—A cell that provides insulation to nerve cells by forming a myelin sheath around axons.

**Passage**—A round of cell growth and proliferation in cell culture.

**Plasticity**—The ability of stem cells from one adult tissue to generate the differentiated cell types of another tissue.

**Pluripotent**—Ability of a single stem cell to develop into many different cell types of the body.

**Proliferation**—Expansion of a population of cells by the continuous division of single cells into two identical daughter cells.

**Regenerative or reparative medicine**—A treatment in which stem cells are induced to differentiate into the specific cell type required to repair damaged or depleted adult cell populations or tissues.

**Signals**—Internal and external factors that control changes in cell structure and function.

**Somatic stem cells**—Another name for adult stem cells.

**Stem cells**—Cells with the ability to divide for indefinite periods in culture and to give rise to specialized cells.

**Stromal cells**—Non-blood cells derived from blood organs, such as bone marrow or fetal liver, which are capable of supporting growth of blood cells *in vitro*. Stromal cells that make this matrix within the bone marrow are also derived from mesenchymal stem cells.

**Subculturing**—The process of growing and replating cells in tissue culture for many months.

**Surface markers**—Surface proteins that are unique to certain cell types, which are visualized using antibodies or other detection methods.

**Teratoma**—A tumor composed of tissues from the three embryonic germ layers. Usually found in ovary and testis. Produced experimentally in animals by injecting pluripotent stem cells, in order to determine the stem cells' abilities to differentiate into various types of tissues.

**Transdifferentiation**—The observation that stem cells from one tissue may be able to differentiate into cells of another tissue.

**Trophoblast**—The extraembryonic tissue responsible for implantation, developing into the placenta, and controlling the exchange of oxygen and metabolites between

## Glossary

mother and embryo.

**Undifferentiated**—Not having changed to become a specialized cell type.